The effect of implementing cardiopulmonary resuscitation video-based online learning in acquiring the knowledge and skills in the physical education students

Shimmaa Mohamed Elsayed[1], Ahmed Gamal Mahdy[2], Maysa Abdalla Elbiaa[3]
[1] Lecturer, Critical care, and emergency department, Faculty of Nursing, Damanhour University, Egypt.
[2]Lecturer Water Sports Training, Faculty of sports education, Matrouh University, Matrouh, Egypt.
[3] Lecturer Critical care and Emergency Nursing. Faculty of Nursing. Matrouh University, Matrouh, Egypt.
Corresponding author:
Shimmaa Mohamed Elsayed[1], Damanhour University, Egypt.
Email: shimmaa.elsayed@nur.dmu.edu.eg; mohamedshimmaa2016@gmail.com
ORICD ID: https://orcid.org/0000-0002-2065-7494.

Abstract

Background: Traditional teaching is the most direct and successful instruction approach. The use of Video-based online learning for CPR is considered an effective instruction method and could be highly beneficial in training high school students to perform competent CPR. This study aimed to evaluate effect of implementing cardiopulmonary resuscitation video-based online learning in acquiring the knowledge and skills in the physical education students. **Material and method:** A quasi-experimental design was utilized. A convenience sample of 220 undergraduate physical education students was included. Two tools were utilized to obtain data for this study. Tool, one comprised two parts; part one, sociodemographic data; and part two, a cardiopulmonary resuscitation knowledge questionnaire. Tool two used to assess CPR procedure using cardiopulmonary resuscitation skills checklist. **Results:** There was a statistically significant difference in both learning groups in the immediate and after one-month period knowledge test (p immediate <0.001, p one month period <0.001). The video online learning group had a significant increase in their practical skills than the traditional learning skills in the immediate test (p immediate <0.001) and after one month test (p one month period <0.001). **Conclusions:** Using video-based online learning in cardiopulmonary resuscitation training effectively acquired the knowledge and skills in physical education students. **Recommendation**: Using video online learning effectively improve psychomotor skills to non-medical and medical students and facilitates remembering effective CPR skills. Video-based learning help nursing educators to deep understand the benefits and value of utilizing this method in the clinical training of CPR skills for medical and nonmedical individuals which increase their satisfaction and skill acquisition.

Keywords: Video online learning; Cardiopulmonary resuscitation; traditional learning; Simulation.

Introduction

Diseases of the cardiovascular system are the leading cause of death in developed countries. One of the explanations is sudden cardiac death (SCD) caused by cardiac arrest, which is most commonly triggered by the consequences of acute myocardial infarction (AMI) (Dumcke et al., 2019). Immediate cardiopulmonary resuscitation (CPR) or at least immediate chest compressions by non-professionals are necessary as Basic Life Support (BLS) techniques reduce out-of-hospital cardiac arrest fatality rates and raise the odds of survival rate by more than twice as high as that associated with no CPR before emergency medical services arrival (Khan & Vaillancourt, 2017). Several studies (Kim & Shin, 2019; Lactona & Suryanto, 2021; Magid et al., 2018) found key obstacles to CPR education, beginning with substantial funds for external teachers and special training materials must be available. People with clinically silent cardiac illness who engage in moderate to vigorous physical activity are at an elevated risk of SCA episodes. Many SCA victims have no prior cardiac diagnoses. Governments and sports organizations should educate and invest in members of the public, security personnel, and healthcare professionals about the importance of performing CPR, and AED use immediately. Teachers expressed their desire for more equipment and hardcopy materials

for teaching practice and activities in the classroom (Magid et al., 2018).

In the world of education, new technologies are gaining traction, for example, the use of electronic communication, social media, and video (Abu Farha et al., 2020). The use of virtual reality (VR) training for cardiopulmonary resuscitation (CPR) is considered an effective learning tool for non-medical students. It could be highly beneficial for educating high school students to be proficient CPR providers (Barsom et al., 2020). Effective CPR necessitates the acquisition of both theoretical and practical skills. The first is frequently taught through e-learning, whereas the latter is taught in a classroom setting by an instructor. CPR training boosts learners' desire to conduct CPR in a real-life situation by increasing their understanding (Barsom et al., 2020).

Traditional teaching is the most direct and efficient approach to instruction. When learners are confronted with challenges or disputes, teachers can successfully control and inspire them. They adopt a flexible teaching method, adapting the content to the real need within the overall teaching arrangement, which is beneficial not only to the development of a basic approach but also to the formation of students' self-study abilities (Rajabi & Hashemian, 2015& Utami, 2018). Learners imitate the acts and language of their teachers, which has a substantial impact on students' opinions on right and wrong, attitude, value orientation, and intellectual level (Chunyang & Fei, 2014). Traditional teaching approaches are used in most educational institutions in our country. Teachers use chalk and a chalkboard to demonstrate concepts to pupils in the traditional teaching method. The blackboard is used to write everything significant about the topic, and students use it to take important notes. After the lecture, students repeat their notes and try to remember them. The primary goal of traditional education is to pass the exam. Traditional education has both advantages and disadvantages (Namitha, 2018).

Learning is the process of acquiring new information, skills, and abilities. As a result, learning is viewed as one of the most important pillars of societal transformation. Learners understand more thoroughly from words and pictures together than from words alone, according to Mayer's Multimedia Learning Theory (2014). To put it another way, a picture can convey a thousand words. Additionally, Mayer's hypothesis suggested that the brain does not perceive a multimedia presentation of images unless the components are organized to correspond to the students' prior knowledge (Vygotsky, 1997& Mayer & Moreno, 2014). There were considerable variations in learning outcomes between E-learning and traditional learning, according to numerous research. Whether it is more productive, some people support traditional learning while others believe in the E-learning platform (Elfaki et al., 2019). Therefore, it is essential to adopt instructional strategies that allow students to develop cognitive, emotional, and psychomotor skills. The transition in video-based learning research to more asynchronous and noninteractive systems between the two periods, and the evolution of technology between the two periods, are remarkable (Alpert & Hodkinson, 2019& Rajabi & Hashemian, 2015)

Because of the advancement of internet technology, e-learning has become a critical approach and novel concept, which is widely used and implemented by educational institutions worldwide. The primary objective of this survey was to ascertain the effect of E-learning on students' academic achievement (Elfaki et al., 2019). The use of virtual reality (VR) training for cardiopulmonary resuscitation (CPR) appears to be an effective learning tool for non-medical students and could be extremely beneficial for educating high school students to be competent CPR providers. However, the apparent connection between the classroom and reality has a detrimental effect on self-confidence, which is critical in motivating students to conduct CPR (Barsom et al., 2020).

Videos have increased the value of teaching and learning in the tertiary education. While video-based learning is not a novel concept, it is becoming increasingly important in the blended learning environment (Yin et al., 2020). Videos boosted their attention to the lecture's topic, and they also had a favourable impact on their motivation and concentration levels (Brame, 2016). Video is excellent for skimming and reviewing knowledge, but students are more likely to accept and use this medium in their learning if they watch the entire video. Visual video is regarded as a splitting technology. Video learning is an audio-visual learning tool that provides real-world instances with plenty of contexts. Researchers believe that using films in class was a success, particularly in presenting concepts, and that utilizing videos is a good teaching strategy. In instructional activities, video-based learning is considered a significant online learning resource (Colasante & Douglas, 2016).

However, there is currently limited data about the ideal training method for CPR. Learners watch short videos pre-recorded by instructors and study by themselves in preparation for a class. Even when cardiopulmonary resuscitation (CPR) is administered, it is frequently unsuccessful due to a lack of information and training. There is a correlation between the quality of bystander CPR and the patient's outcome. Therefore, Simulation training is regarded as critical for acquiring cardiopulmonary resuscitation skills (CPR) (Dumcke et al., 2019; Elfaki et al., 2019; Rajabi & Hashemian, 2015).

Prior research indicates that video-based training is helpful useful in teaching medical material. Most video-based CPR courses utilize a brief PowerPoint presentation with step-by-step voice-over narration that can be easily disseminated over a network. Second-line CPR courses have been shown to improve learning, as well as knowledge, abilities, and behaviours relevant to cardiac arrest care (Barsom et al., 2020; Hasselqvist-Ax et al., 2015). Therefore, we aimed to evaluate effect of implementing cardiopulmonary resuscitation video-based online learning in acquiring the knowledge and skills in the physical education students.

Significance of the study:

In this context, video-based learning has termed the process of gaining specific knowledge and improving competencies and abilities through the systematic aid provided by video resources (Giannakos et al., 2016). Researchers believe that utilizing videos in class was a success, particularly in displaying concepts, so using videos is a good teaching strategy. In addition, video-based learning is recognized as a significant online learning resource in instructional activities. Since the classroom setting encourages blended learning, video-based learning has gained traction (Yin et al., 2020). When students were questioned about their satisfaction with using video as a teaching tool during their training, most of them stated that they were content with the overall experience and that the educational film helped them understand. This result was comparable to Abu Farha et al.,)2020) who found that using films in the learning process culminated in greater student satisfaction than utilizing alternative approaches. As a result, we advise using instructive visual videos in the learning process.

Aim of the study:

The aim of this study is evaluate the effect of implementing cardiopulmonary resuscitation video-based online learning in acquiring the knowledge and skills in the physical education students.

Research questions:

- What is the effect of implementing cardiopulmonary resuscitation video-based online learning in acquiring the knowledge and skills in the physical education students?

Material and Method

Study design:

A quasi-experimental design was used in this study. This design include two criteria using of the control group for comparison and presence of intervention on the study group.

Lack of randomization is the missed criteria in this design.

Research settings

This study was conducted at the Faculty of Physical Education Matrouh University which involved students in non-medical field and study in the Physical Education field.

Subject:

A convenience sample technique was used of 220undergraduate physical education students was taken throughout the second semester year 2022-2021. They were divided into two equal groups 110 in group one and 110 in group two. Group one was traditional learning group and group two was video-based on-line learning.

Tools of data collection:

Two tools were utilized to gather data for this study (Dumcke et al., 2019; Elfaki et al., 2019; Rajabi & Hashemian, 2015. The tool one consisted of two parts; part one, sociodemographic data; part two, a **cardiopulmonary resuscitation knowledge questionnaire**. A well-structured self-designed, validated questionnaire was used to assess the two group participants' knowledge about CPR before the training program application (pre-test) before starting the training, and this questionnaire consisted of 25 multiple-choice questions. Regarding the used questionnaire, equal marks were given for each question post-test (1), and one month later, post-test 2 was performed. The scores were converted to a percentage scale about CPR for their knowledge, which was scored as (Very poor), (Poor), (An average), (Good), (Very good), and (An excellent). Group one was received a lecture and practical presentations. The substance of the courses on cardiac arrest involved an overview that remained for 20 min, adult CPR (20 min), and defibrillation (20 min). The researchers prepared a video containing a short lecture for teaching cardiopulmonary resuscitation "CPR". A PowerPoint file was developed to construct the video presented as a slide show and sound. Group two was provided a CD or flash drive of the video contents. The video was accessible to the enrolling students one week prior to the lecture, and they asked to watch the video before class time.

Tool II: **Cardiopulmonary resuscitation skills checklist**. A checklist was used to assess the participant's practice in two groups: using SRAP CABD mnemonic for evaluation their performance. This mnemonic refers to safety, responsiveness, activation of code blue, positioning, compression, airway, breathing, and defibrillation respectively. It used to evaluate 9 items of students CPR performance. The score divided into 1 for complete performance; 0.5 incomplete performance; and 0 score for not done. The total score was 25. The mean of score was calculated and compared between groups.

Validity and Reliability

Reliability was done and it was accepted. Content validity was done f by five panel of expert in emergency and critical care nursing. The necessary modifications were done.

Pilot Study

A pilot test was conducted on 22 students and necessary modifications were done.

Procedures:

Before data collection, ethical approval was obtained to conduct study from faculty of nursing the research committee, Damanhour university. An official written permission was obtained from the faculty of physical education Matrouh university to conduct study. Three months for collecting data, both group were subjected to the same questionnaire and checklist to detect their level of knowledge and skills about CPR. Each group was trained using a CPR simulator about how to perform effective CPR and how to use AED effectively. Hands-on demonstration of chest compressions on adult CPR manikins, and applying airway management, using defibrillation was carried out. Group one and two had received a theoretical and practical presentations on cardiac arrest and three CPR scenarios as if patient had pulse and breathing, or if patient had no breath and had pulse, or if patient had no pulse and breathing. Group two had received a CD or flash drive of the CPR

video contents. The video was online accessible to the enrolling students one week prior to the lecture, and they asked to watch the video before class time. The researchers prepared a video containing a short lecture for teaching cardiopulmonary resuscitation "CPR". A PowerPoint file was developed to construct the video presented as a slide show and sound. The knowledge level was test at three-time intervals before the presentation, immediate after presentation and after one month from training. The performance level was assessed immediately and after one month.

Ethical considerations:

Approval from the faculty of nursing the research committee, Damanhour university was be obtained (code61 -b). the participant had right refused to participate in the study. The participants had the right to withdraw from the study at any time without any effect on their learning.

Statistical analysis

Data entry was done and analysed using IBM SPSS software package version 20.0. Numbers and percentages were used to describe qualitative data. Kolmogorov-Smirnov test was used to test the normality of distribution. Range, mean, standard deviation, median was used to described quantitative data. The significance of the obtained results was limited at the 5% level.

Results:

Figure (1) illustrated the frequency distribution of both groups concerning academic years. About 40% of the traditional learning group experienced the first and third academic years, and 40% of the video-based online learning group experienced the second academic year.**Figure (2)** compared the two studied groups as per previous experience. Around 60% of the traditional learning group, and 57.3% of the video online learning group had no previous family history of cardiac disease. Most of the group had no family history of sudden cardiac death. Concerning recent CPR training in the previous 2 years, it was found that 61.8% of the traditional learning group and 60% of the video online learning group did not receive CPR training in in the previous two years. More the half of both groups did not experience actual CPR. **Figure (3)** illustrated the source of information about CPR in both groups. University was the major source of information in both traditional and video online learning groups (78.2% and 78.3%, respectively). **Table 1** indicated comparison between both groups in relation to CPR knowledge at three different interval time. In the traditional learning group, it was found that the mean knowledge score had immediate (Mean ± SD= 15.59 ± 2.42) and after one month (Mean ± SD= 17.97 ± 1.84) increased than the pretest (Mean ± SD= 13.35 ± 3.41) with significance difference (p traditional pre-post-test <0.001). While, the video online learning group, it was found that the mean knowledge score had been immediate (Mean ± SD= 17.97 ± 1.84) and after 1 month (Mean ± SD= 20.15 ± 1.53) increased than the pretest (Mean ± SD= 14.35 ± 3.41) with significance difference (p video pre-post-test <0.001). There was no statistically significant difference in both learning groups concerning the knowledge pretest (p=0.760). At the same time, there was a statistically significant difference in both learning groups in the immediate and after one-month period knowledge test (p immediate <0.001, p one month period <0.001).

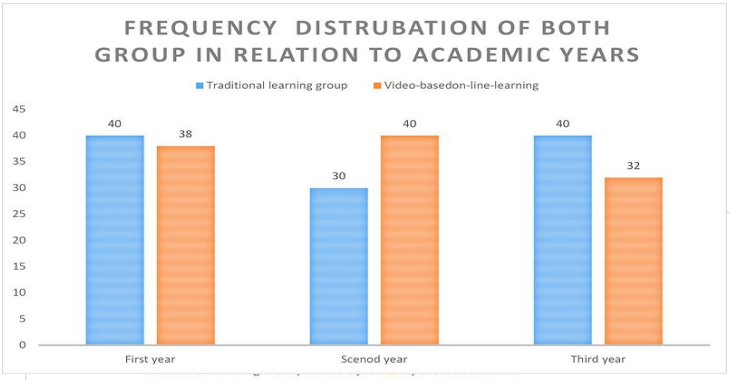

Figure 3: Source of information about CPR

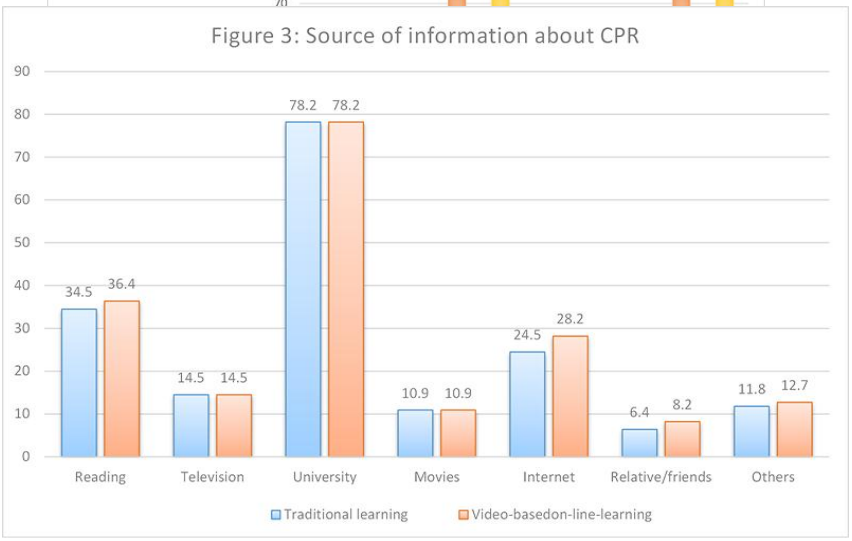

Table (1): Comparison between both groups in relation to CPR knowledge at three different interval time.

Cardiopulmonary resuscitation knowledge	Group one : Traditional learning group (n = 110)			Group two: Video-based on-line learning (n = 110)			U(p_1)	U(p_2)	U(p_3)
	Before	Immediately	After 1 month	Before	Immediately	After 1 month			
	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD.	Mean ± SD			
Total score	13.35 ± 3.41	15.59 ± 2.42	17.97 ± 1.84	14.35 ± 3.41	17.97 ± 1.84	20.15 ± 1.53	0.094 (0.760)	2674.00* (<0.001*)	2241.50* (<0.001*)
% Score	53.38±13.64	62.36 ± 9.67	71.89 ± 7.36	54.38±13.64	71.89 ± 7.36	80.62 ± 6.13			
Fr. (p_0)	108.014*(<0.001*)			135.244*(<0.001*)					

U: Mann Whitney test **Fr**: **Friedman test** p_0: p-value for contrasting between the studied periods in each group p_1: p-value for contrasting between the studied groups in the **pre-period** p_2: p-value for contrasting between the studied groups in the **immediate period** p3: p-value for contrasting between the studied groups in After 1 month period *: Statistically significant at $p \leq 0.05$

Table 2 Comparison between both groups in relation to CPR practice at two different interval time. In the traditional learning group, it was found that the mean practical skills score significantly decreased (p traditional pre-post-test <0.001) in the immediate test (Mean ± SD= 20.04 ± 1.81) than after one month test (Mean ± SD= 18.67 ± 2.16). While the video online learning group, it was found that the mean practical skills score had significantly decreased (p video pre-post-test <0.001) in the immediate test (Mean ± SD= 21.04 ± 1.98) than after one month test (Mean ± SD= 20.01 ± 1.82). The video online learning group had a significant increase in their practical skills than the traditional learning skills in the immediate test (p immediate <0.001) and after one month test (p one month period <0.001).

Table 3 indicated comparison between both groups in relation to performance of high-quality CPR steps at two different interval time. It was found that the video online learning group had a statistically significant difference from the traditional learning group in the performance of high-quality CPR in the immediate and after one month performance. Group two had better performance and memorizing the steps of high-quality CPR than group one after one month from training including using backboard p=0.02, knee beside the victim p=0.01, using the placement of hand on victim chest p=0.04, push hard and fast p=0.01, minizine interpretation p=0.02.

Table 4 illustrated comparison between both groups in relation to Cardiopulmonary resuscitation skills at two different interval time. In the immediate practical test, both traditional and video online learning groups had no statistically significant difference in checking the safety and responsiveness before starting CPR; putting the victim in the position; checking pulse and breathing simultaneously; giving recuse breath; and using a defibrillator (p=0.077, 0.247, 0.080, 0.250, 0.313, 0.243 respectively). At the same time, they had statistically significant differences in activation of code blue, chest compression, and opening airway (p=0.02, 0.02, 0.02, respectively). After the period of one month, both traditional and video online learning groups had statistical significance differences in checking the safety and responsiveness before starting CPR; activation of code blue; effective chest compression; open airway; giving recuse breath; and using a defibrillator (p=00.01, 0.030, 0.043, 0.025, 0.047, 0.010, and 0.010, respectively).

Table (2): Comparison between both groups in relation to CPR practice at two different interval time.

CPR practice	Group one: Traditional learning group (n = 110)		Group two: Video-based on-line learning (n = 110)		U(p_1)	U(p_2)
	Immediately	After 1 month	Immediately	After 1 month		
	Mean ± SD.	Mean ± SD.	Mean ± SD.	Mean ± SD.		
Total score	20.04 ± 1.81	18.67 ± 2.16	21.04 ± 1.98	20.01 ± 1.82	4303.50* (<0.001*)	3847.50* (<0.001*)
% Score	66.97 ± 15.06	55.61 ± 17.99	75.30 ± 16.47	66.74 ± 15.17		
Z (p_0)	4.611*(<0.001*)		5.375*(<0.001*)			

U: Mann Whitney test Z: **Wilcoxon signed ranks test** p_0 p_1: p-value for contrasting between the studied groups in the **immediate period** p_2: p-value for contrasting between the studied groups in **After 1 month period** *: Statistically significant at $p \leq 0.05$

Table (3): Comparison between both groups in relation to performance of high quality CPR steps at two different interval time

	High-Quality CPR Performance Steps	Group one: Traditional learning group (n = 110)				Group two: Video-based on-line learning (n = 110)				χ^2 (p_2)	χ^2 (p_3)
		Immediately		After 1 month		Immediately		After 1 month			
		No.	%	No.	%	No.	%	No.	%		
1	Ensure patient is in supine position on hard surface "back board".	36	32.7	55	50.0	82	74.5	72	65.5	38.677*(<0.001*)	5.383*(0.020*)
2	Kneel by the side of the victim	80	72.7	62	56.4	82	74.5	80	72.7	0.094(0.760)	6.436* (0.011*)
3	Place heel of dominant hand on the center of the lower half of the sternum of the bare chest between nipples.	74	67.3	56	50.9	81	73.6	71	64.5	1.070(0.301)	4.191*(0.041*)
4	Interlace & raise fingers of both hands away from patient's chest	59	53.6	54	49.1	80	72.7	67	60.9	8.617*(0.003*)	3.104(0.078)
5	Keep elbow straight.	57	51.8	50	45.5	78	70.9	63	57.3	8.455*(0.004*)	3.075(0.080)
6	Position shoulders directly over hands and the victim's chest	78	70.9	65	59.1	82	74.5	81	73.6	0.367(0.545)	5.213*(0.022*)
7	Push hard & fast	96	87.3	60	54.5	81	73.6	77	70.0	6.504*(0.011*)	5.591*(0.018*)
8	Allow complete chest recoil after each compression with equal duration	68	61.8	61	55.5	83	75.5	73	66.4	4.751*(0.029*)	2.749(0.097)
9	Minimize interruptions in compression	57	51.8	55	50.0	82	74.5	70	63.6	12.212*(<0.001*)	5.383*(0.020*)

χ^2: **Chi-square test** p_2: p-value for contrasting between the studied groups in the **immediate period** p_3: p-value for contrasting between the studied groups in **After 1 month period** *: Statistically significant at $p \leq 0.05$

Table (4): Comparison between both groups in relation to Cardiopulmonary resuscitation skills at two different interval time:

SRAP CAPD	Cardiopulmonary resuscitation skills	Traditional learning group (n = 110)				Video-based on-line learning (n = 110)				χ^2(p_1)	χ^2 (p_2)
		Immediately		After 1 month		Immediately		After 1 month			
		No.	%	No.	%	No.	%	No.	%		
S	Safety environment	71	64.5	53	48.2	83	75.5	72	65.5	3.117 (0.077)	6.688* (0.010*)
R	Response check.	71	64.5	54	49.1	79	71.8	70	63.6 %	1.341 (0.247)	4.731* (0.030*)
A	Activation of code blue.	75	68.2	62	56.4	90	81.8	75	68.2	5.455* (0.020*)	4.111* (0.043*)
P	Position	85	77.3	73	66.4	95	86.4	84	76.4	3.056 (0.080)	2.691 (0.101)
P	Pulse and breathing check simultaneously	70	63.6	56	50.9	78	70.9	69	62.7	1.321 (0.250)	3.131 (0.077)
C	Chest compressions	75	68.2	62	56.4	90	81.8	75	68.2	5.455* (0.020*)	5.051* (0.025*)
A	Airway	75	68.2	62	56.4	90	81.8	75	68.2	5.455* (0.020*)	3.958* (0.047*)
B	Breathing	71	64.5	59	53.6	78	70.9	71	64.5	1.019 (0.313)	6.688* (0.010*)
D	Defibrillation	72	65.5	59	53.6	80	72.7	72	65.5	1.362 (0.243)	6.688* (0.010*)

χ^2: **Chi-square test** p_1: p-value for contrasting between the studied groups in the **immediate period** p_2: p-value for contrasting between the studied groups in **After 1 month period** *: Statistically significant at $p \leq 0.05$

Discussion:

Non-healthcare trainers are regularly accomplished cardiopulmonary resuscitation techniques, so that ordinary people may provide appropriate first aid until medical help arrives. The effect of implementing CPR video-based online learning on retention of knowledge and skills at different times intervals among the physical education students' at Matrouh University was investigated. Prior to training, respondents in this study had a comparable understanding of cardiopulmonary resuscitation. In comparison, both studies groups improved their knowledge after CPR training. According to Budiman's theory () (Hinkel, 2013), the more educated person is, the simpler it is for them to learn information, leading to increased knowledge. Edgar Dale's pyramid of audio-visual media experience may involve the senses of hearing and sight in channelling information to the brain to a degree of 75-87% (Aeni & Yuhandini, 2018).

The CPR video training group immediately responded more effectively than the traditional learning group. Surprisingly, the study group responds more effectively than the control group after one month of their training. In contrast to the control group, the study group that got the film had most remarkable persistence in knowledge, and skill performance. In comparison, the difference between CPR practical skills in both groups, it was found that the study group had a significant increase in their practical skills than the traditional learning group in the

immediate and after one month of skill practice.

These findings agree with Lestari et al. (2021), who conducted a pre-experimental study on 207 students using a one-group pre-post-test methodology. A total of 179 students (86.5 %) were determined to have high knowledge levels after finishing health education utilizing the audio-visual technique. Barsom et al. (2020) reported that virtual reality training for CPR looks to be a good learning tool for non-medical students, and it might be very useful in educating high school students to be competent CPR givers. The cognitive theory of multimedia learning provides a useful framework for understanding the processes involved and how video might help or impede learning. It also lays out several fundamental concepts for good video design, including guidelines for how visual, verbal, and text-based material should interact in the video (Mayer & Moreno, 2014). This can reduce some of the cognitive load associated with bringing concepts to life or finishing a "mental animation" process to make sense of things, particularly in STEM subjects (Castro-Alonso et al., 2019). The control group who used the traditional ways decreased in their knowledge and practice after one month compared to the CPR video-based online learning.

Prior to research examining the simulation and audio-visual, learning methods showed contradictory results regarding the power to enhance and sustain the efficacy of CPR instruction, and information retention might be boosted by simulation-based re-learning following the training (Kim & Shin, 2019). These findings are in line with Cho (2016), who reported that because the control group's skills performance was contrasted immediately after and six months after training, the control group's skills performance was dramatically lowered six months after training. As a result, skill performance declines between three and six months and appears to be severely impaired after a year. Iterative simulation-based ALS training has been shown to improve skill retention to retain these talents. Like Baiq et al., this study uses a quantitative design and one-group pre-posttest analysis. The findings indicate that audio-visual instruction in basic life support affects students' knowledge and abilities (Fatmawati et al., 2019).

Carmichael et al. (2018) reported that teachers and students benefit greatly from video, which stimulates better course performance in various circumstances and has a favourable impact on student motivation, confidence, and attitudes. Between 2000 and 2014, one study conducted by Taslibeyaz et al. (2017) in the context of medical education discovered that watching films aided in acquiring clinical skills, modifying attitudes, enhancing cognitive learning, and the retention of knowledge. Students appear to appreciate the video and have a favourable attitude toward it. They appreciate the freedom it gives them in terms of when and where they learn, as well as the pace at which they learn and what they learn.

In contrast to the control group, the study group improved their performance with the high quality of CPR steps. This can be interpreted due to educational videos having a significant impact on student learning and how they directly influence the evolution of teaching and learning techniques more broadly. This finding is supported by (Berger et al., 2019; Neumar et al., 2015; Rushton et al., 2020; Siddaiah-Subramanya et al., 2017), who found that the physical ability to undertake CPR with the appropriate compression rate and depth is a critical factor for successful CPR. To improve CPR skills, hands-on practice is required. This finding is contrary to Nas et al. (2020), who discovered that when compared to face-to-face training, virtual reality training did not produce sufficient results in terms of compression rate and depth. According to the paper, Leary et al. (2019) showed no significant change in compression rate between the study and intervention groups. The researchers conclude from the preceding explanation that a solid

comprehension of skills in cardiac resuscitation demonstrates a good understanding of skills. Therefore, cardiopulmonary resuscitation video-based online learning has a better effect on acquiring the knowledge and skills among the physical education students than the traditional learning method.

Conclusion and recommendation:

Non-medical physical education students who trained through video-based online than who trained using traditional method had better CPR skill performance at two different time intervals immediately and after one month. Video-based online students had better knowledge level before, immediately after presentation, and after one months than the traditional group.Video-based online training help student to overcome memorize the steps of procedure. Students' perceptions of their likely learning performance, their levels of attention, interest, and engagement, and their eventual learning performance are all influenced by the visuals in films.

Recommendation: The following suggestions were made based on the study's findings and conclusion. Using video online learning effectively improve psychomotor skills to non-medical and medical students and facilitates remembering effective CPR skills. In addition, students have found videos that incorporate the process more entertaining, which results in increased practice engagement, which is critical for improving learning outcomes. Video-based learning help nursing educators to deep understand the benefits and value of utilizing this method in the clinical training of CPR skills for medical and nonmedical individuals which increase their satisfaction and skill acquisition.

Acknowledgements

The researcher appreciates and thank the students who participated in the present study.

References

Ab Farha, R. K., Rashad, M., Hasen, E., Mukattash, T. L., Al-Hashar, A., & Basheti, I. A. (2020). Evaluation of the effect of video tutorial training on improving pharmacy students' knowledge and skills about medication reconciliation. Pharmacy practice, 18(1), 1711. https://doi.org/10.18549/PharmPract.2020.1.1711.

Aeni, N., & Yuhandini, D. S. (2018). Pengaruh Pendidikan Kesehatan dengan media video dan metode demonstrasi terhadap pengetahuan sadari. Jurnal Care, 6(2), 162. https://doi.org/10.33366/cr.v6i2.929.

Apert, F., & Hodkinson, C. S. (2019). Video use in lecture classes: current practices, student perceptions and preferences. Education + Training, 61(1), 31–45. https://doi.org/10.1108/ET-12-2017-0185

Barsom, E. Z., Duijm, R. D., Dusseljee-Peute, L. W. P., Landman-van der Boom, E. B., van Lieshout, E. J., Jaspers, M. W., & Schijven, M. P. (2020). Cardiopulmonary resuscitation training for high school students using an immersive 360-degree virtual reality environment. British Journal of Educational Technology, 51(6), 2050-2062. https://doi.org/https://doi.org/10.1111/bjet.13025.

Berger, C., Brinkrolf, P., Ertmer, C., Becker, J., Friederichs, H., Wenk, M., Van Aken, H., & Hahnenkamp, K. (2019). Combination of problem-based learning with high-fidelity simulation in CPR training improves short and long-term CPR skills: a randomised single blinded trial. BMC medical education, 19(1), 180. https://doi.org/10.1186/s12909-019-1626-7.

Brame, C. J. (2016). Effective Educational Videos: Principles and Guidelines for Maximizing Student Learning from Video Content. CBE—Life Sciences Education, 15(4), es6. https://doi.org/10.1187/cbe.16-03-0125

Carmichael, M., Reid, A. K., Karpicke, J. D., & Bradley, J. V. (2018). Assessing the Impact of Educational Video on Student Engagement, Critical Thinking and Learning: The Current State of Play. SAGE publisher.

Castro-Alonso, J. C., Paas, F., & Ginns, P. (2019). Embodied Cognition, Science Education, and Visuospatial Processin. In J. C. Castro-Alonso (Ed.), Visuospatial Processing for Education in Health and Natural Sciences (p.p. 175-205). Springer International Publishing.

Cho, G. Y. (2016). Effects of a Simulation-based education on Cardiopulmonary Emergency Care Knowledge, Critical Thinking and

Problem solving ability in Nursing Students. Journal of Fisheries and Marine Sciences Education, 28(2), 439–449. https://doi.org/10.13000/JFMSE.2016.28.2.439.

Chunyang, L., & Fei, L. (2014). The Discussion of Traditional Teaching and Multimedia Teaching Approach in College English Teaching. Proceedings of the 2014 International Conference on Management, Education and Social Science, 86, 31-33. https://doi.org/10.2991/icmess-14.2014.9.

Colasante, M., & Douglas, A. (2016). Prepare-participate-connect: Active learning with Video. Australasian Journal of Educational Technology, 32(4), 68-92.

Dumcke, R., Wegner, C., Böttiger, B., Kucknat, L., & Rahe-Meyer, N. (2019). The process of implementing cardiopulmonary resuscitation training in schools: A review of current research. Journal of Innovation in Psychology, Education and Didactics, 23(2), 141-166.

Elfaki, N., Ahmad, I., & Abdelrahim, R. (2019). Impact of e-learning vs traditional learning on students' performance and attitude. International Medical Journal, 24(3), 13412051.

Fatmawati, B. R., Suprayitna, M., & Prihatin, K. (2019). Efektifitas Edukasi Basic Life Support dengan Media Audiovisual dan Praktik Terhadap Tingkat Pengetahuan dan Keterampilan Mahasiswa Program Studi Ilmu Keperawatan Jenjang D.III Stikes Yarsi Mataram Tahun 2018. Jurnal Kesehatan Qamarul Huda, 7(1), 6-12. https://doi.org/10.37824/jkqh.v7i1.2019.68.

Giannakos, M. N., Jaccheri, L., & Krogstie, J. (2016). Exploring the relationship between video lecture usage patterns and students' attitudes. British Journal of Educational Technology, 47(6), 1259–1275. https://doi.org/10.1111/bjet.12313.

Hasselqvist-Ax, I., Riva, G., Herlitz, J., Rosenqvist, M., Hollenberg, J., Nordberg, P., Ringh, M., Jonsson, M., Axelsson, C., Lindqvist, J., Karlsson, T., & Svensson, L. (2015). Early cardiopulmonary resuscitation in out-of-hospital cardiac arrest. The New England journal of medicine, 372(24), 2307-2315. https://doi.org/10.1056/NEJMoa1405796.

Hinkel, B. (2013). Theory on the Educated Person. from https://neviewpoint.com/2013/03/06/theory-on-the-educated-person/

Khan, F., & Vaillancourt, C. (2017). Cardiopulmonary resuscitation. Canadian Medical Association Journal, 189(1), E25–E25. https://doi.org/10.1503/cmaj.160393

Kim, S. H., & Shin, J. H. (2019). Effects and retention of self-re-learning using video recording of CPR on nursing student's knowledge, self-efficacy, and skill performance. Resuscitation, 142, e71-e72. https://doi.org/10.1016/j.resuscitation.2019.06.171.

Lactona, I. D., & Suryanto, S. (2021). Efficacy and knowledge of conducting CPR through online learning during the COVID-19 pandemic: A literature review. Journal of public health research, 10(2), 2208. https://doi.org/10.4081/jphr.2021.2208.

Leary, M., McGovern, S. K., Chaudhary, Z., Patel, J., Abella, B. S., & Blewer, A. L. (2019). Comparing bystander response to a sudden cardiac arrest using a virtual reality CPR training mobile app versus a standard CPR training mobile app. Resuscitation, 139, 167-173. https://doi.org/10.1016/j.resuscitation.2019.04.017.

Lestari, K. B., Lestari, I. F., & Santoso, I. (2021). The Impact of Health Education Using Online Learning on Adolescent Knowledge of Anaemia. International Seminar on Language, Education, and Culture, 209-220. https://doi.org/10.18502/kss.v5i3.8541.

Magid, K. H., Heard, D., & Sasson, C. (2018). Addressing Gaps in Cardiopulmonary Resuscitation Education: Training Middle School Students in Hands-Only Cardiopulmonary Resuscitation. The Journal of school health, 88(7), 524-530. https://doi.org/10.1111/josh.12634.

Mayer, R. E., & Moreno, R. (2014). Cognitive Theory of Multimedia Learning. In R. Mayer (Ed.), The Cambridge Handbook of Multimedia Learning (2nd ed p.p. 31-49). Cambridge University Press.

Nas, J., Thannhauser, J., Vart, P., van Geuns, R. J., Muijsers, H. E. C., Mol, J. Q., Aarts, G. W. A., Konijnenberg, L. S. F., Gommans, D. H. F., Ahoud-Schoenmakers, S., Vos, J. L., van Royen, N., Bonnes, J. L., & Brouwer, M. A. (2020). Effect of Face-to-Face vs Virtual Reality Training on Cardiopulmonary

Resuscitation Quality: A Randomized Clinical Trial. JAMA cardiology, 5(3), 328-335. https://doi.org/10.1001/jamacardio.2019.4992.

Neumar, R. W., Shuster, M., Callaway, C. W., Gent, L. M., Atkins, D. L., Bhanji, F., Brooks, S. C., de Caen, A. R., Donnino, M. W., Ferrer, J. M., Kleinman, M. E., Kronick, S. L., Lavonas, E. J., Link, M. S., Mancini, M. E., Morrison, L. J., O'Connor, R. E., Samson, R. A., Schexnayder, S. M., Singletary, E. M., et al. (2015). Part 1: Executive Summary: 2015 American Heart Association Guidelines Update for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. Circulation, 132(18 Suppl 2), S315-367. https://doi.org/10.1161/cir.0000000000000252.

Rajabi, B., & Hashemian, M. (2015). Impact of Traditional, Blended Learning, and Task Planning on the Learning of Resumptive Pronouns by Iranian EFL Learners. Mediterranean Journal of Social Sciences, 6, 39–46. https://doi.org/10.5901/mjss.2015.v6n4s1p39.

Rushton, M. A., Drumm, I. A., Campion, S. P., & O'Hare, J. J. (2020). The Use of Immersive and Virtual Reality Technologies to Enable Nursing Students to Experience Scenario-Based, Basic Life Support Training-Exploring the Impact on Confidence and Skills. Computers informatics nursing, 38(6), 281-293. https://doi.org/10.1097/cin.0000000000000608.

Siddaiah-Subramanya, M., Smith, S., & Lonie, J. (2017). Mastery learning: how is it helpful? An analytical review. Advances in medical education and practice, 8, 269-275. https://doi.org/10.2147/amep.s131638.

Taslibeyaz, E., Aydemir, M., & Karaman, S. (2017). An analysis of research trends in articles on video usage in medical education. Education and Information Technologies, 22(3), 873–881. https://doi.org/10.1007/s10639-015-9461-x.

Namitha, C. (2018). Modern methods of teaching. Journal of Applied and Advanced Research, S39–S41. https://doi.org/10.21839/jaar.2018.v3iS1.167

Utami, I. S. (2018). The effect of blended learning model on senior high school students' achievement. SHS Web of Conferences, 42, 00027. https://doi.org/10.1051/shsconf/20184200027

Vygotsky, L. (1997). The collected works of L.S. Vygotsky. Plenum.

Yin, K. Y., Bing, K. W., Hadi, F. S., & Bakar, M. S. (2020). The Effect of Video-based Collaborative Learning among Economics' Undergraduates in Malaysia. International Journal of Advanced Science and Technology, 29(6), 272 - 281.